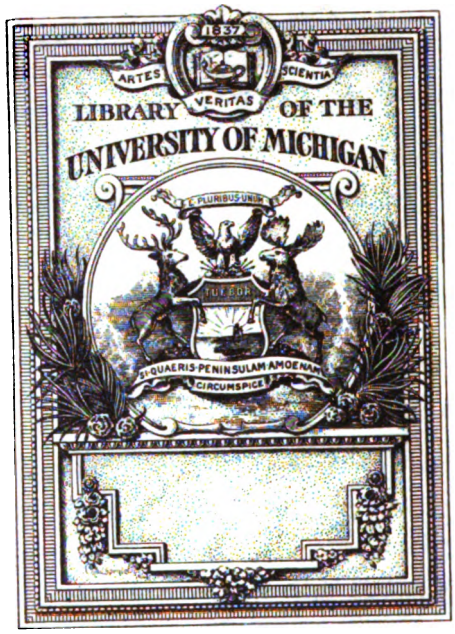

THE GIFT OF

DEPARTMENT OF THE INTERIOR—U. S. GEOLOGICAL SURVEY
CHARLES D. WALCOTT, DIRECTOR

THE AMERICAN AND FOREIGN IRON TRADE IN 1897 AND IMMEDIATELY PRECEDING YEARS

BY

JAMES M. SWANK

EXTRACT FROM THE NINETEENTH ANNUAL REPORT OF THE SURVEY, 1897-98
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THE AMERICAN IRON TRADE IN 1897 AND IMMEDIATELY PRECEDING YEARS.

By JAMES M. SWANK,

General Manager of the American Iron and Steel Association.

DISTRIBUTION OF IRON AND STEEL WORKS, BY STATES.

Before we proceed to give the details of the production of the iron and steel industries of the United States in 1897 and immediately preceding years, the reader will be interested in learning from the following table how the country's iron and steel works are distributed among the several States. The table has been compiled from the fourteenth edition of the Directory to the Iron and Steel Works of the United States, published in July, 1898, by the American Iron and Steel Association.

Number of iron and steel works and tin-plate works in the United States in 1898, by States.

State.	Blast furnaces.	Rolling mills and steel works.	Steel works (included in preceding column).			Tin-plate works.
			Bessemer.	Open-hearth.	Crucible.	
Maine	.....	1	.....	.....	.....	.....
New Hampshire	.....	1	.....	1	.....	.....
Massachusetts	3	12	1	4	.....	.....
Rhode Island	.....	1	.....	.....	.....	.....
Connecticut	5	9	.....	1	3	.....
New York	19	23	1	4	4	3
New Jersey	10	21	.....	5	6	.....
Pennsylvania	162	225	20	48	21	31
Delaware	.....	10	.....	1	.....	.....
Maryland	8	5	1	.....	1	4
Virginia	27	7	1	.....	.....	1
West Virginia	4	7	2	.....	.....	2
Kentucky	9	9	1	2	.....	1
Tennessee	19	4	.....	.....	1	.....

Number of iron and steel works and tin-plate works in the United States—Continued.

State.	Blast furnaces.	Rolling mills and steel works.	Steel works (included in preceding column).			Tin-plate works.
			Bessemer.	Open-hearth.	Crucible.	
North Carolina	2	.....	.....	.....	.....	.....
Georgia	4	1	.....	.....	.....	.....
Alabama	45	10	.....	3	.....	.....
Texas	4	1	.....	.....	.....	.....
Ohio	55	67	7	10	2	16
Indiana	.....	33	3	5	1	6
Illinois	17	26	5	8	1	3
Michigan	13	3	1	1	1	1
Wisconsin	6	6	1	3	3	.....
Minnesota	1	3	.....	1	.....	.....
Missouri	3	7	.....	1	.....	1
Iowa	.....	1	.....	.....	.....	.....
Kansas	.....	1	.....	.....	1	.....
Colorado	3	2	1	.....	.....	.....
Wyoming	.....	1	.....	.....	.....	.....
Washington	.....	1	.....	.....	.....	.....
Oregon	1	1	.....	.....	.....	.....
California	.....	5	.....	1	.....	.....
Total	420	504	45	99	45	69

It will be observed, by reference to the table, that our blast furnaces are situated in 22 States, our rolling mills and steel works in 31 States, and our tin-plate works, of which there are 69, in 11 States.

Of the 420 furnaces that are mentioned, all but 79 use bituminous coal and coke and anthracite coal, the remainder using charcoal. The annual capacity of the whole number of furnaces, after making due allowance for those that are not likely to run again, was about 18,000,000 long tons in April, 1898. To the whole number of furnaces may be added 4 large new furnaces that are now in a forward state of construction, and these furnaces will add about 500,000 tons to the total annual capacity we have mentioned.

Omitting all forged products, the annual capacity in finished products of the rolling mills in April, 1898, was 17,929,850 long tons, against 14,763,920 tons in January, 1896. The number of puddling furnaces in April, 1898, each double furnace counting as two single furnaces, was 3,889, against 4,408 in January, 1896, a decrease of 519.

Of the whole number of rolling mills mentioned, 51 were prepared to roll standard, girder, light T, and other rails; 66 were equipped to manufacture all kinds of structural material, including bridge rods,

building rods, plates for bridge work, structural tubing, etc.; 230 were equipped to manufacture plate, sheet, and skelp iron and steel; 46 were devoted in whole or in part to the manufacture of cut nails and spikes, 9 other works buying their nail plate; 24 made wire rods, and 79 made wire nails.

The total number of completed Bessemer steel works in April, 1898, including 2 Clapp-Griffiths plants and 1 Robert-Bessemer plant, was 45, containing exactly 100 converters. The annual converting capacity of the whole number of Bessemer steel plants in April, 1898, was 10,633,000 tons. No new Bessemer steel plants have been built since 1896.

In April, 1898, there were 99 completed open-hearth steel plants, with 283 furnaces built and building, the whole number having an annual capacity of 3,522,250 tons of ingots and direct castings. At the same time there were 45 completed crucible-steel plants, with an annual capacity of 95,000 tons.

The number of pig and scrap iron bloomeries not connected with rolling mills or machine shops in April, 1898, was reduced to 10, of which several were then idle, while in the whole country there were only 2 forges that made blooms directly from the ore. Of all the southern forges that once made bar iron directly from the ore only one is left—Helton forge, in North Carolina, and it was not in operation in 1897.

PRODUCTION OF IRON AND STEEL IN THE UNITED STATES.

The last paper which we had the honor to prepare for the Geological Survey, and which was printed in 1897,[1] gave a comprehensive summary of the progress of the iron and steel industries of the United States for a long series of years, including tables of production and prices and of imports and exports, and also including a comparison of the progress of the iron and steel industries of the United States with that of other countries. Details of the production of iron and steel in the United States in the last few years will now be presented, to be followed by chapters devoted to subjects of special interest relating to the present condition of our iron and steel industries. We pass over the statistics of the production of iron ore, coal, coke, and other raw materials in the production of iron and steel because they will be presented by others. The iron trade of the United States was active and prosperous in the second half of 1897, and has been remarkably active thus far in 1898.

Pig iron.—The following table gives the total production of pig iron in the United States from 1890 to 1897. It shows serious fluctuations in eight years.

[1] Iron and steel and allied industries in all countries: Eighteenth Ann. Rept. U. S. Geol. Survey, Part V (Mineral Resources), 1897, pp. 51–140.

Production of pig iron in the United States from 1890 to 1897, inclusive.

Year.	Production.
	Long tons.
1890	9,202,703
1891	8,279,870
1892	9,157,000
1893	7,124,502
1894	6,657,388
1895	9,446,308
1896	8,623,127
1897	9,652,680

Twenty States made pig iron in 1896 and nineteen States in 1897. The following table gives the production of pig iron by States in 1896 and 1897, in the order of their prominence in 1897.

Production of pig iron in the United States in 1896 and 1897, by States.

State.	1896.	1897.	State.	1896.	1897.
	Long tons.	*Long tons.*		*Long tons.*	*Long tons.*
Pennsylvania	4,024,166	4,631,634	New Jersey	59,163	95,696
Ohio	1,196,326	1,372,889	Kentucky	70,660	35,899
Illinois	925,239	1,117,239	Missouri	12,548	23,883
Alabama	922,170	947,831	Georgia	15,593	17,092
Virginia	386,277	307,610	Connecticut	10,187	8,336
Tennessee	248,338	272,130	Colorado	45,104	6,582
New York	206,075	243,304	Texas	1,221	6,175
Maryland	79,472	193,702	Massachusetts	1,873	3,284
West Virginia	108,569	132,907	North Carolina	2,151	.....
Michigan	149,511	132,578			
Wisconsin	158,484	103,909	Total	8,623,127	9,652,680

The total production of 9,652,680 tons of pig iron in 1897 was divided as follows: Bessemer pig iron, 5,795,584 tons; charcoal pig iron, excluding a few tons of charcoal Bessemer, included above, 251,738 tons; basic pig iron, 556,391 tons; spiegeleisen and ferro-manganese, 173,695 tons; foundry, forge, and other kinds of pig iron, 2,875,272 tons.

Fully nine-tenths of our total production of pig iron is now made with coke, as the following figures of production in 1897 by fuels will show: Raw bituminous coal and coke, but almost entirely coke, 8,464,692 tons; mixed anthracite and coke, 911,628 tons; anthracite alone, 21,149 tons; charcoal, 255,211 tons. Much the larger part of the fuel classed as mixed anthracite and coke is composed of coke. The small quantity of

pig iron produced with anthracite alone in 1897 compares strangely with the details of production as late as 1874, in which year more pig iron was made with unmixed anthracite than with coke and raw bituminous coal combined.

Statistics collected by the American Iron and Steel Association show that the total production of pig iron in the first half of 1898 was 5,909,703 long tons, against 4,403,476 tons in the first half of 1897 and 5,249,204 tons in the second half. The increase in the first half of 1898 over the last half of 1897 was 660,499 tons; over the first half of 1897 it was 1,506,227 tons. The figures for the first half of 1898 indicate a total production in the whole year exceeding 11,500,000 tons and probably near 11,750,000 tons.

Bessemer steel.—Eight States made Bessemer steel in 1897, namely: New York, Pennsylvania, Maryland, West Virginia, Kentucky, Ohio, Illinois, and Michigan. The total production of Bessemer steel ingots in 1897 was 5,475,315 long tons, against 3,919,906 tons in 1896, 4,909,128 tons in 1895, 3,571,313 tons in 1894, and 3,215,686 tons in 1893. There was an increase of 1,555,409 tons, or over 39 per cent, in 1897 as compared with 1896. The production in 1897 was much the largest in our history. The following table shows the production by States of Bessemer steel ingots in the last five years. Direct castings are counted as ingots.

Production of Bessemer steel ingots in the United States from 1893 to 1897.

State.	1893.	1894.	1895.	1896.	1897.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
Pennsylvania	2,126,220	2,334,548	2,978,924	2,292,814	3,060,049
Ohio	348,141	363,974	719,954	568,535	1,041,541
Illinois.....	314,829	581,540	866,531	780,105	943,774
Other States.....	426,496	291,251	343,719	278,452	429,951
Total	3,215,686	3,571,313	4,909,128	3,919,906	5,475,315

Open-hearth steel.—Twelve States made open-hearth steel in 1897, namely: Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Alabama, Ohio, Indiana, Illinois, Wisconsin, Missouri, and California. The total production of open-hearth steel ingots and direct castings in 1897 was 1,608,671 long tons, against 1,298,700 tons in 1896, an increase of 309,971 tons, or almost 24 per cent. Of the total production in 1897, 1,056,043 tons were made by the basic process and 552,628 tons by the acid process. In 1896 the production by the basic process amounted to 776,256 tons and by the acid process to 522,444 tons. The following table shows the production of open-hearth steel ingots and direct castings by States during the last six years:

Production of open-hearth steel ingots in the United States from 1892 to 1897, inclusive.

State.	1892.	1893.	1894.	1895.	1896.	1897.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
New England.....	18,620	24,759	26,204	36,733	48,055	51,402
New York and New Jersey	19,511	17,591	21,363	32,203	32,120	39,521
Pennsylvania	551,010	616,516	659,969	904,352	1,009,608	1,271,751
Ohio	60,834	50,385	54,182	75,637	64,691	78,357
Illinois.....	19,914	28,639	23,218	49,500	101,832	120,609
Other States.....				38,757	42,394	47,031
Total	669,889	737,890	784,936	1,137,182	1,298,700	1,608,671

Crucible and other steel.—Our crucible-steel industry makes no progress, nor does the crucible-steel industry of any other country. The place of crucible steel has been largely taken by steel made by other processes. Ten States made crucible steel in 1897, namely: Connecticut, New York, New Jersey, Pennsylvania, Maryland, Tennessee, Ohio, Indiana, Illinois, and Wisconsin. The total production in 1897 amounted to 69,959 long tons, against 60,689 tons in 1896, 67,666 tons in 1895, 51,702 tons in 1894, 63,613 tons in 1893, 84,709 tons in 1892, 72,586 tons in 1891, and 71,175 tons in 1890.

The production of steel in 1897 by various minor processes amounted to 3,012 long tons, against 2,394 tons in 1896, 858 tons in 1895, 4,081 tons in 1894, 2,806 tons in 1893, 4,548 tons in 1892, 4,484 tons in 1891, and 3,793 tons in 1890.

Total production of steel.—The production of all kinds of steel in 1897 was as follows: Bessemer steel, 5,475,315 long tons; open-hearth steel, 1,608,671 tons; crucible steel, 69,959 tons; all other steel, 3,012 tons; total, 7,156,957 tons, against 5,281,689 tons in 1896, 6,114,834 tons in 1895, 4,412,032 tons in 1894, 4,019,995 tons in 1893, and 4,927,581 tons in 1892.

Rails.—Ten States made rails in 1897, namely: Pennsylvania, Maryland, Alabama, Tennessee, Ohio, Illinois, Wisconsin, Colorado, Wyoming, and California. All these States made Bessemer steel rails except Tennessee, Alabama, and Wyoming. Iron rails were made in Pennsylvania, Tennessee, Alabama, Ohio, Illinois, Colorado, and Wyoming. Open-hearth steel rails were made in Alabama and California.

The production of all kinds of rails in the United States in 1897, including light and heavy rails, and street, electric, and mine rails, was 1,647,892 long tons, against 1,122,010 tons in 1896, an increase of 525,882 tons, or over 46 per cent. The production of 1897 was composed of 1,614,399 tons of Bessemer steel rails rolled by the producers of domestic ingots; 30,121 tons of Bessemer steel rails rerolled from old steel rails and rolled from purchased blooms; 500 tons of open-hearth steel

rails, and 2,872 tons of iron rails. The following table gives the production of all kinds of rails in the United States from 1890 to 1897.

Production of all kinds of rails in the United States from 1890 to 1897, inclusive.

Year.	Iron.	Steel.	Total.	Year.	Iron.	Steel.	Total.
	Long tons.	*Long tons.*	*Long tons.*		*Long tons.*	*Long tons.*	*Long tons.*
1890....	13,882	1,871,425	1,885,307	1894	4,674	1,017,098	1,021,772
1891....	8,240	1,298,936	1,307,176	1895	5,810	1,300,325	1,306,135
1892....	10,437	1,541,407	1,551,844	1896	4,347	1,117,663	1,122,010
1893....	6,090	1,130,368	1,136,458	1897	2,872	1,645,020	1,647,892

The maximum production of all kinds of rails in this country was reached in 1887, when 2,139,640 long tons were made. The year of next largest production was 1890, when we made 1,885,307 tons. The year of next largest production was 1897, the output amounting to 1,647,892 tons.

Structural shapes.—In this classification we include beams, beam girders, zee bars, tees, channels, angles, and other structural forms, but do not include plate girders made from plates. Nearly all the structural shapes and plates used for structural purposes are made of steel. The total production in 1896 was 495,571 long tons, and in 1897 it was 583,790 tons. In 1895 it was 517,920 tons, and in 1894 it was 360,305 tons.

Plates and sheets.—The production of plate and sheet iron and steel in the United States in 1897, excluding nail plate and skelp iron and steel, amounted to 1,207,286 long tons, against 965,776 tons in 1896, 991,459 tons in 1895, 682,900 tons in 1894, 674,345 tons in 1893, and 751,460 tons 1892. The production of "black plates for tinning" alone in 1897 is reported to have amounted to 271,886 long tons, against 185,387 tons in 1896, an increase of 86,499 tons, or over 46 per cent.

Wire rods.—The production of iron and steel wire rods in 1897 amounted to 970,736 long tons, against 623,986 tons in 1896 and 791,130 tons in 1895, showing an increase of 346,750 tons, or over 55 per cent, over 1896, and 179,606 tons over 1895.

Wire nails.—The production of iron and steel wire nails in 1897 amounted to 8,997,245 kegs of 100 pounds each, compared with 4,719,860 kegs in 1896, an increase of 4,277,385 kegs, or over 90 per cent. In 1895 the production amounted to 5,841,403 kegs, in 1894 to 5,681,801 kegs, and in 1893 to 5,095,945 kegs.

Cut nails.—In the following statistics cut spikes are included with cut nails, but railroad and other spikes and machine-made horseshoe nails are not included. The total production of cut nails in 1897 was 2,106,799 kegs of 100 pounds each, against 1,615,870 kegs in 1896, an increase of 490,929 kegs, or over 30 per cent. With the single exception of 1897 there has been a steady decline in the production of cut nails

since 1886, in which year the maximum production of 8,160,973 kegs was reached.

Comparative nail statistics.—The following table gives the total production of cut nails and wire nails, from 1886 to 1897, in kegs of 100 pounds:

Production of cut nails and wire nails in the United States from 1886 to 1897, inclusive.

Year.	Cut nails.	Wire nails.	Year.	Cut nails.	Wire nails.
	Kegs.	*Kegs.*		*Kegs.*	*Kegs.*
1886.....	8,160,973	600,000	1892.....	4,507,819	4,719,524
1887.....	6,908,870	1,250,000	1893.....	3,048,933	5,095,945
1888.....	6,493,591	1,500,000	1894.....	2,425,060	5,681,801
1889.....	5,810,758	2,435,000	1895.....	2,129,894	5,841,403
1890.....	5,640,946	3,135,911	1896.....	1,615,870	4,719,860
1891.....	5,002,176	4,114,385	1897.....	2,106,799	8,997,245

Total production of rolled iron and steel.—Twenty-six States rolled either iron or steel or both iron and steel in 1897, two less than in 1896. The production of all iron and steel rolled into finished forms in the United States in 1897 was 7,001,728 long tons, against 5,515,841 tons in 1896, an increase of 1,485,887 tons, or almost 27 per cent. The following table gives the total production by States of rolled iron and steel in 1896 and 1897:

Production of rolled iron and steel in the United States in 1896 and 1897, by States.

State.	1896.	1897.	State.	1896.	1897.
	Long tons.	*Long tons.*		*Long tons.*	*Long tons.*
Maine.....	5,728	2,519	Alabama.....	31,864	37,763
New Hampshire...			Ohio.....	767,020	1,017,124
Massachusetts.....	85,308	94,319	Indiana.....	198,567	254,376
Rhode Island.....	35,288	30,233	Illinois.....	590,975	863,013
Connecticut.....			Michigan.....	137,050	136,016
New York.....	80,873	81,283	Wisconsin.....		
New Jersey.....	76,522	86,421	Minnesota.....		
Pennsylvania.....	3,138,144	3,956,727	Missouri.....	32,326	35,505
Delaware.....	38,818	43,982	Colorado.....	54,574	22,710
Maryland.....	4,826	82,926	Wyoming.....	39,733	37,997
Virginia.....	26,129	26,482	Washington.....		
West Virginia.....	138,096	151,424	Oregon.....		
Kentucky.....	25,809	30,968	California.....		
Tennessee.....	8,191	9,940			
Georgia.....			Total.....	5,515,841	7,001,728

Iron blooms and billets.—The production of these articles in independent forges that are not connected with rolling mills or machine shops is a decaying industry. The iron blooms and billets produced in forges

directly from the ore in 1897 amounted to 1,455 long tons, against 1,346 tons in 1896, 40 tons in 1895, 40 tons in 1894, 864 tons in 1893, 2,182 tons in 1892, 5,290 tons in 1891, 7,094 tons in 1890, and 11,078 tons in 1889. The iron blooms produced in forges from pig and scrap iron in 1897, and which were for sale and not intended for the consumption of the makers, amounted to 7,159 long tons, against 6,494 tons in 1896, 7,185 tons in 1895, 3,221 tons in 1894, and 6,605 tons in 1893.

Summary of statistics for 1896 and 1897.—In the following table we summarize the leading statistical facts presented in preceding pages concerning the development of our iron and steel industries in 1896 and 1897, anticipating in the last lines information to be given hereafter.

Summary of statistics relating to the iron and steel industries of the United States in 1896 and 1897.

Subject.	1896.	1897.
Production of pig iron, long tons	8,623,127	9,652,680
Production of spiegeleisen and ferro-manganese, included in pig iron, long tons	131,940	173,695
Production of bar, hoop, skelp, etc., and structural shapes, not including wire rods, long tons	2,731,932	3,081,760
Production of iron and steel structural shapes, included above, long tons	495,571	583,790
Production of iron and steel wire rods, long tons	623,986	970,736
Production of plate and sheet iron and steel, except nail plate, long tons	965,776	1,207,286
Production of iron and steel cut nails and cut spikes, kegs of 100 pounds	1,615,870	2,106,799
Production of iron and steel wire nails, kegs of 100 pounds	4,719,860	8,997,245
Production of all rolled iron and steel, including cut nails and excluding rails, long tons	4,393,831	5,353,836
Production of all rolled iron and steel, including both cut nails and rails, long tons	5,515,841	7,001,728
Production of Bessemer steel rails, long tons	1,116,958	1,644,520
Production of open-hearth steel rails, long tons	705	500
Production of iron rails, long tons	4,347	2,872
Production of all kinds of rails, long tons	1,122,010	1,647,892
Production of street rails, included above, long tons	145,210	122,244
Production of Bessemer steel, long tons	3,919,906	5,475,315
Production of open-hearth steel, long tons	1,298,700	1,608,671
Production of crucible steel, long tons	60,689	69,959
Production of blister and patented steel, long tons	2,394	3,012

Summary of statistics relating to the iron and steel industries, etc.—Continued.

Subject.	1896.	1897.
Production of all kinds of steel, long tons	5,281,689	7,156,957
Production of ore, pig, and scrap blooms, for sale, long tons	7,840	8,614
Production of tin plates and terne plates for year ending June 30, pounds	307,228,621	446,982,063
Value of imports of iron and steel	$19,462,561	$13,836,204
Value of exports of iron and steel	$48,670,218	$62,737,250
Imports of iron ore, long tons	682,806	489,970

THE IRON-ORE INDUSTRY OF CUBA.

The first considerable importation of iron ore into this country was in 1873, when about 46,000 tons were imported, the most of which came from Canada. More than one-half of our imports came from Canada in 1873, 1874, and 1875. In 1879 we commenced to import iron ore largely from the Mediterranean countries, virtually all from Spain, Algeria, and Elba. Before that year the imports from Canada had declined. In 1884 we commenced to import iron ore from Cuba, and it is from this country that our imports of iron ore are now chiefly derived. The following table shows our total imports from 1872 to 1897 from all countries:

Imports of iron ore into the United States from 1872 to 1897, inclusive.

Fiscal year.	Quantity.	Calendar year.	Quantity.	Calendar year.	Quantity.
	Long tons.		*Long tons.*		*Long tons.*
1872	23,733	1880	493,408	1889	853,573
1873	45,981	1881	782,887	1890	1,246,830
1874	57,987	1882	589,655	1891	912,856
1875	56,655	1883	490,875	1892	806,585
1876	17,284	1884	487,820	1893	526,951
1877	30,669	1885	390,786	1894	168,541
1878	28,212	1886	1,039,433	1895	524,153
1879 (fiscal)	150,197	1887	1,194,301	1896	682,806
1879 (calendar)	284,141	1888	587,470	1897	489,970

Iron ore of excellent quality, suitable for the manufacture of Bessemer steel, is found in large quantities near the coast in the province of Santiago de Cuba, in the southeastern part of the Island of Cuba, and near to the now famous city of Santiago. Three American companies have undertaken the development of these deposits of iron ore, the Juragua Iron Company, Limited, the Spanish-American Iron Company, and the Sigua Iron Company. These companies have expended large

sums in opening mines, and in building railroads, wharves, and piers. The first two of these companies mentioned have shipped many cargoes of iron ore to the United States, and they have also commenced to ship ore to foreign countries. The first shipments made by the Juragua Iron Company, Limited, were in August, 1884; the first shipments by the Spanish-American Iron Company were in 1895, and the first shipments by the Sigua Iron Company were in October, 1892. The imports of Cuban iron ore into the United States from 1884 to the close of 1897, included in the above table, were as follows:

Imports of Cuban iron ore into the United States from 1884 to 1897, inclusive.

Year.	Quantity.	Year.	Quantity.	Year.	Quantity.
	Long tons.		*Long tons.*		*Long tons.*
1884	21,798	1889	256,278	1894	150,439
1885	81,106	1890	362,068	1895	386,044
1886	111,710	1891	266,377	1896	409,883
1887	97,711	1892	330,357	1897	397,173
1888	198,048	1893	362,685		

During 1897 the Juragua Iron Company, Limited, exported to the United States 244,817 long tons of iron ore from its Cuban mines, which was a decrease of 53,482 tons as compared with its total exports in 1896. In addition, 5,932 tons were exported by this company to Pictou, Nova Scotia, in 1897. Of the quantity exported by this company in 1897 there were received at Philadelphia 32 cargoes, containing 113,060 tons, and at Baltimore 40 cargoes, containing 131,757 tons. The total exports of iron ore by this company to the United States from 1884 to the close of 1897 amounted to 3,076,827 tons, shipped in 1,103 cargoes.

The Spanish-American Iron Company shipped 74,992 long tons of iron ore from its Cuban mines in 1895. In 1896 the shipments to the United States amounted to 111,584 tons, and in 1897 to 152,356 tons, of which latter quantity 36,919 tons were received at Philadelphia and 115,437 tons at Baltimore. The same company also shipped 51,537 tons of iron ore to various foreign countries in 1897, as follows: to Antwerp, 17,834 tons; to Newcastle-on-Tyne, 6,491 tons; to Glasgow, 10,712 tons; to Pictou, Nova Scotia, 8,916 tons; to Cardiff, 3,800 tons; and to Rotterdam, 3,784 tons.

No iron ore was shipped in 1894, 1895, 1896, or 1897 from the Cuban mines of the Sigua Iron Company. This company exported 14,022 long tons of iron ore in 1893 and 7,830 tons in 1892, when its first shipments were made.

Shipments of iron ore from Cuba were interrupted by the war with Spain, but have been resumed since the termination of hostilities in August last. A great increase in shipments may now be expected as compared with previous years.

Manganese ores are not of frequent occurrence in the United States, but they are an essential raw material in the manufacture of Bessemer and open-hearth steel. Manganese mines of great extent and richness were opened in the interior of the province of Santiago de Cuba a few years ago, and a branch railroad was built which connected them with a railroad to the coast. One cargo of ore was shipped to the United States before the breaking out of the Cuban insurrection in 1895, when operations were stopped until peace should be restored. The mines are situated at Ponupo, and the company mining them is styled the Ponupo Iron Company, the stockholders being Pennsylvanians. The company has recently made arrangements to commence active work at the mines, when shipments to the United States will doubtless be resumed.

THE MANUFACTURE OF TIN PLATES IN THE UNITED STATES.

The manufacture of tin plates in the United States was undertaken in 1873 at Wellsville, Ohio, and at Leechburg, Pennsylvania. In 1875 it was also undertaken at Demmler, near Pittsburg. Owing, however, to the low duty which was imposed on foreign tin plates, domestic tin plates ceased in 1878 to be made at the three places mentioned, and no further attempts to establish the tin-plate industry in our country were made until about the time of the passage of the tariff act of October 1, 1890, in which the previously existing duty on tin plates was more than doubled. Since that date the tin-plate industry in the United States has grown with wonderful rapidity, the production in the six fiscal years beginning with July 1, 1891, and ending with June 30, 1897, having been as follows, in long tons:

Production of tin and terne plates in the United States from 1892 to 1897, inclusive.

[Fiscal years.]

Articles.	1892.	1893.	1894.	1895.	1896.	1897.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
Tin plates.....	2,026	20,421	36,433	53,718	94,906	158,638
Terne plates.....	4,066	24,141	25,720	32,800	42,250	40,908
Total	6,092	44,562	62,153	86,518	137,156	199,546

The total production of tin plates in the six fiscal years from 1892 to 1897 was 366,142 long tons; of terne plates, 169,885 tons; total, 536,027 tons. In April, 1898, there were in the United States 69 completed tin-plate works, and 1 additional works was in course of erection.

The following table, compiled from the publications of the Bureau of Statistics of the Treasury Department, shows the quantities of tin plates and terne plates imported into the United States in each calendar year from 1872 to 1897, with their foreign values. It shows a steady and rapid decline in imports since 1891.

Imports of tin plates and terne plates into the United States from 1872 to 1897, inclusive.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	Long tons.			*Long tons.*	
1872	85,629	$13,893,450	1885	228,596	$15,991,152
1873	97,177	14,240,868	1886	257,822	17,504,976
1874	79,778	13,057,658	1887	283,836	18,699,145
1875	91,054	12,098,885	1888	298,238	19,762,961
1876	89,946	9,416,816	1889	331,311	21,726,707
1877	112,479	10,679,028	1890	329,435	23,670,158
1878	107,864	9,069,967	1891	327,882	25,900,305
1879	154,250	13,227,659	1892	268,472	17,102,487
1880	158,049	16,478,110	1893	253,155	15,539,423
1881	183,005	14,886,907	1894	215,068	12,053,167
1882	213,987	17,975,161	1895	219,545	11,482,380
1883	221,233	18,156,773	1896	119,171	6,140,161
1884	216,181	16,858,650	1897	83,851	4,366,828

The statistics of the production of tin plates and terne plates in the United States in the fiscal year 1898 are not yet available, but there are good reasons for assuming that the total production in that year would amount to almost 300,000 tons. This production, according to the latest statistical information in our possession, is equal to if not in excess of the production of Great Britain in 1897, so that in a period of seven years we have built up a tin-plate industry that already equals that of our tin-plate rival. But for the drawback provision in all our recent tariffs we would not now import any tin plates or terne plates.

OUR IMPORTS AND EXPORTS OF IRON AND STEEL.

Less than twenty years ago the imports of iron and steel into this country were of extraordinary magnitude, notwithstanding the fact that we possessed all the natural resources for the production of these articles that were possessed by any other country, and notwithstanding the further fact that we were not lacking in either the skill or the capital that was necessary to develop these resources. But we had not been able to assemble the raw materials or to manufacture iron or steel as cheaply as our European competitors, and the duties on iron and steel were not sufficient in many instances to counterbalance the increased cost of production at home. Long distances were to be overcome in bringing the raw materials together, and railroad freight rates were still exceedingly onerous. The cost of labor was very much higher than in Europe. The American market was therefore in large part controlled by foreign manufacturers.

In the supply of tin plates and terne plates, which we have elsewhere referred to, foreigners enjoyed a complete monopoly of our market.

Duties on wire rods, cotton ties, crude steel, and even pig iron and bar iron were wholly insufficient to prevent large importations. Gradually, however, as the direct result of the encouragement afforded by protective duties, which led to the improvement of processes, the substitution of more powerful machinery, and the development of new fields of iron-ore supply, the cost of production in all lines in this country has approximated that of European countries, so that to-day, with the help of low railroad rates, our manufacturers of iron and steel not only control their own home market under an exceedingly moderate scale of duties but have entered into active competition with their European rivals in the supply of the world's markets. The great change that has taken place in our imports and exports of iron and steel will be seen at a glance in the following tables, which we have compiled from the reports of the Bureau of Statistics of the Treasury Department.

The following table gives the foreign values of all our imports of iron and steel, including pig iron, bar iron, plate and sheet iron, tin plates, wire rods, iron and steel rails, cotton ties, crude steel, fire arms, hardware, machinery, cutlery, etc., in the calendar years from 1871 to 1897:

Value of all imports of iron and steel and manufactures thereof into the United States from 1871 to 1897, inclusive.

Year.	Value.	Year.	Value.	Year.	Value.
1871	$57,866,299	1880	$80,443,362	1889	$42,027,742
1872	75,617,677	1881	61,555,077	1890	44,540,413
1873	60,005,538	1882	67,075,125	1891	41,983,626
1874	37,652,192	1883	47,506,306	1892	33,882,447
1875	27,363,101	1884	37,078,122	1893	29,656,539
1876	20,016,603	1885	31,144,552	1894	20,843,576
1877	19,874,399	1886	41,630,779	1895	25,772,136
1878	18,013,010	1887	56,420,607	1896	19,462,561
1879	33,331,569	1888	42,311,689	1897	13,836,204

The following table gives the total value of our exports of iron and steel and manufactures thereof in the calendar years from 1871 to 1897. These exports embrace chiefly machinery, builders' hardware, sewing machines, saws, shovels, axes, hatchets, and other tools, locomotives, car wheels, printing presses, iron and steel bridges, firearms, scales and balances, pig iron, steel rails, cut nails, wire nails, wire, miscellaneous castings, and engines and boilers, but do not include agricultural implements, which are composed largely of iron and steel.

Value of all exports of iron and steel and manufactures thereof from the United States from 1871 to 1897, inclusive.

Year.	Value.	Year.	Value.	Year.	Value.
1871	$14,185,359	1880	$15,156,703	1889	$23,712,814
1872	12,595,539	1881	18,216,121	1890	27,000,134
1873	14,173,772	1882	22,348,834	1891	30,736,507
1874	17,312,239	1883	22,716,040	1892	27,900,862
1875	17,976,833	1884	19,290,895	1893	30,159,363
1876	13,641,724	1885	16,622,511	1894	29,943,729
1877	13,549,922	1886	14,865,087	1895	35,071,563
1878	15,101,899	1887	16,235,922	1896	48,670,218
1879	14,223,646	1888	19,578,489	1897	62,737,250

The decline in our imports of iron and steel and the increase in our exports are still better illustrated in the statistics of both movements in the fiscal year 1898, ending on June 30, 1898. In this year we imported iron and steel and manufactures of iron and steel amounting, in foreign value, to $12,214,938, and our exports of articles in the same classification, not including agricultural implements, amounted to $70,405,923. It is worthy of note that our exports of agricultural implements, which are mainly composed of iron and steel, have also greatly increased in the last fiscal year. For several years these exports had averaged between $4,000,000 and $5,000,000 in value annually, but in the fiscal year 1898 they amounted to $7,609,732.

It is possible to give the details of only a part of our exports of iron and steel. The following table gives the quantities of leading articles of iron and steel and the values of all articles of iron and steel exported in the fiscal year 1898:

Quantity and value of articles of iron and steel exported from the United States in 1898.

Exports—Fiscal year ending June 30, 1898.	Quantity.	Value.
	Long tons.	
Ferro-manganese	8,403	$344,743
All other pig iron	228,465	2,385,252
Scrap and old, for remanufacture	60,195	632,334
Bar iron	4,769	163,261
Band, hoop, or scroll iron	1,552	47,327
Bars, or rods of steel, other than wire	16,864	470,052
Steel wire rods	14,464	330,022
Billets, ingots, and blooms	16,100	290,827
Cut nails and spikes	14,424	612,234
Wire nails	10,221	458,787
All other nails, including tacks	1,923	245,722

Quantity and value of articles of iron and steel exported from United States, etc.—Cont'd.

Exports—Fiscal year ending June 30, 1898.	Quantity.	Value.
	Long tons.	
Iron plates and sheets	4,057	$182,809
Steel plates and sheets	12,215	354,579
Iron rails	2,769	37,150
Steel rails	229,783	4,613,376
Structural iron and steel	30,586	1,183,482
Wire	61,185	2,593,306
Locomotive engines, whole number, 468		3,883,719
Locks, hinges, and other builders' hardware		3,997,796
Saws and tools		2,430,536
Other iron and steel manufactures		45,148,609
Total	717,975	70,405,923

The calendar year 1880 was the year of largest importations of iron and steel, both in quantities and values. In that year we imported 1,886,019 tons of iron and steel the weight of which was ascertained, and in addition we imported large quantities of machinery, hardware, cutlery, firearms, etc., the weight of which was not ascertained. The value of the total importations of iron and steel in 1880 was $80,443,362. The imports of 1880 included 700,864 tons of pig iron, 113,381 tons of bar iron, 118,267 tons of iron rails, 141,277 tons of steel rails, and 619,887 tons of scrap iron and scrap steel. In the following year, 1881, we imported still larger quantities of iron and steel rails—122,333 tons of the former and 222,596 tons of the latter, but of some other articles there was a decline in the imports.

In the fiscal year 1898 we imported only 529 tons of iron and steel rails, 1,502 tons of scrap iron and scrap steel, 15,177 tons of bar iron, and 25,640 tons of pig iron, most of which was spiegeleisen and ferromanganese, while in the same fiscal year we exported, as has been shown in the table above given, 236,868 tons of all kinds of pig iron, 60,195 tons of scrap iron and scrap steel, 229,783 tons of steel rails, 30,586 tons of structural steel, and 61,185 tons of wire.

It is interesting to note the first steps that were made in the development of our export trade in iron and steel and articles made from them. Twenty-two years ago we summarized in one of our Annual Statistical Reports the progress we had already made in finding markets abroad for our iron and steel products. In 1838 the Baldwin Locomotive Works of Philadelphia exported 3 engines, their first shipment to a foreign country, and up to February 1, 1876, they had exported in all 389 engines, valued at $5,005,964. The increase in the number of engines annually sent abroad by these celebrated works had been quite marked since 1869, when 12 engines were built for shipment to foreign

countries, followed in 1870 by 15, in 1871 by 19, in 1872 by 45, and in 1873 by 96. The fact was noted that the Phœnix Bridge Works of Pennsylvania had just sold eight or ten iron bridges to the Great Western Railway of Canada, and had recently sold from thirty to forty iron bridges to the Grand Trunk Railway of Canada and additional bridges to various other Canadian railways.

Our growing export trade in railway cars and agricultural implements was referred to, as was also that in platform and other scales, fire engines, stationary engines, stoves, firearms, hardware, cutlery, and edge tools. At that time the Collins ax and the Ames shovel had proved their superiority by capturing Australian and other markets, and the incident was cited of Mr. Gladstone having recently cut down a large tree with an American ax in preference to an English ax. We had already sent abroad large quantities of cut nails and spikes, chilled car wheels, Hoe's printing presses, hydraulic machinery, and other machinery. We had made a good beginning in building up an export trade in the manufactures of iron and steel, but we had as yet accomplished little worthy of mention in the exportation of pig iron, bar iron, rails, and other crude or heavy forms of iron and steel, and it looked as if we never would accomplish anything in this direction that would gratify our national pride. What we have recently accomplished in the exportation of all lines of iron and steel products has been shown in the tables already given.

Our early triumphs in the exportation of manufactured articles of iron and steel were due almost wholly to the superior quality and adaptability, as well as, in some instances, to the novelty, of these articles, and rarely, if ever, to their cheapness. Now our iron and steel products of every description are sent abroad, not only because they are superior in quality and design, but also because they are produced and sold at low prices.

THE WORLD'S PRODUCTION OF PIG IRON AND STEEL.

On February 21, 1856, the Hon. Abram S. Hewitt, then plain Mr. Hewitt, read a paper before the American Geographical and Statistical Society, at New York, "On the Statistics and Geography of the Production of Iron," in which, for the first time, so far as we are informed, an attempt was made to ascertain the world's production of pig iron. Mr. Hewitt was compelled to estimate the production of several countries, but the total production which he obtained for the world was substantially correct. He found that the total production in 1855, forty-three years ago, was, in round numbers, 7,000,000 long tons. Great Britain's percentage of the total production approximated 50 per cent, while that of the United States was less than 15 per cent.

Twenty years ago, in a review of the iron and steel exhibits at the Universal Exposition at Paris in 1878, we made an attempt to ascertain the world's production of both pig iron and steel in that year, and the

figures then collated from the best available sources we subsequently revised and printed in our Annual Report for 1889. The results then obtained we now reproduce below, including the percentage of production by each country. Long tons are used for Great Britain and the United States and metric tons for all other countries, metric tons being used as the equivalent of long tons in ascertaining total production. Our figures show that the world's production of pig iron just doubled from 1855 to 1878.

The world's production of pig iron and steel in 1878.

Countries.	Pig iron.		Steel.	
	Production.	Percentage.	Production.	Percentage.
	Tons.		*Tons.*	
Great Britain	6,381,051	44.74	1,063,027	36.14
United States	2,301,215	16.13	731,977	24.88
Germany and Luxemburg	2,147,641	15.06	489,151	16.63
France	1,521,274	10.67	312,921	10.64
Belgium	518,646	3.64	102,772	3.49
Austria and Hungary	434,250	3.04	129,416	4.40
Russia	417,239	2.93	66,593	2.26
Sweden	340,858	2.39	25,918	0.88
Spain	60,000	0.42	250	0.01
Italy	20,000	0.14	3,000	0.10
Other countries	120,000	0.84	16,750	0.57
Total	14,262,174	100.00	2,941,775	100.00

It will be seen that Great Britain made 44.74 per cent of the world's production of pig iron in 1878 and that the United States made 16.13 per cent, Great Britain retaining her leadership of 1855 and almost retaining her large percentage of production in that year, while the percentage of the United States in 1878 was almost the same as in 1855, and a very low percentage it was, Germany and Luxemburg making almost as much pig iron as the United States in 1878. Great Britain's production of steel in 1878 was more than one-third of the world's production, while that of the United States was less than one-fourth.

We now present a table showing the world's production of pig iron and steel in 1897, or in the most recent years for which statistics are available, compiled in most instances from official data, the unofficial figures approaching absolute accuracy. Tons are used as in the preceding table. The figures show that the world's production of pig iron more than doubled from 1878 to 1897, and that the world's production of steel increased more than sevenfold in the same period.

The world's production of pig iron and steel in 1897.

Countries.	Pig iron.			Steel.		
	Year.	Production.	Percentage.	Year.	Production.	Percentage.
		Tons.			*Tons.*	
United States	1897	9,652,680	29.30	1897	7,156,957	34.58
Great Britain	1897	8,789,455	26.69	1897	4,585,961	22.16
Germany and Luxemburg	1897	6,879,541	20.89	1896	4,796,226	23.17
France	1897	2,472,143	7.51	1897	1,312,000	6.34
Belgium	1897	1,034,732	3.14	1897	616,604	2.98
Austria and Hungary	1896	1,217,782	3.70	1896	880,696	4.25
Russia	1897	1,868,671	5.67	1895	879,075	4.25
Sweden	1897	538,197	1.63	1897	275,128	1.33
Spain	1897	297,100	0.90	1897	101,800	0.49
Italy	1897	8,393	0.03	1897	63,940	0.31
Canada	1897	53,796	0.16	1897	18,400	0.09
Other countries	1897	125,000	0.38	1897	10,000	0.05
Total	.....	32,937,490	100.00	.....	20,696,787	100.00

The table shows that in 1897 the United States produced 29.30 per cent of the world's production of pig iron and 34.58 per cent of its production of steel, while Great Britain's share of the total production of pig iron was 26.69 per cent, and its share of the total production of steel was 22.16 per cent—the United States having passed since 1878 to the front as a producer of both pig iron and steel, Great Britain taking second place in the production of pig iron and third place in the production of steel, Germany and Luxemburg being second in steel production. The relative position of the United States in the production of pig iron and steel and all iron and steel products will be fully maintained in 1898, as there has been very great activity throughout the year in all branches of our iron and steel industries.

Since the above table was prepared and put in type we have received the statistics of the production of all kinds of steel in Germany and Luxemburg in 1897. The total production was 5,119,300 metric tons. This production will entitle Germany and Luxemburg to a larger percentage of the world's production of steel than is given in the table, but it will not materially modify the percentage of other countries. It brings up the world's total production of steel to 21,019,861 tons.

THE FOREIGN IRON TRADE IN 1897 AND IMMEDIATELY PRECEDING YEARS.

By JAMES M. SWANK,
General Manager of the American Iron and Steel Association.

As in the United States, there was a general advance all along the line in the foreign iron trade in 1897 and in the first half of 1898. The iron and steel industries of Great Britain, Germany, Belgium, France, Sweden, Russia, and Austria-Hungary were all active and prices were well maintained. The iron and steel industries of Great Britain would have been more active than they were but for the occurrence in July, 1897, of one of the most determined struggles between capital and labor that has ever occurred, the great English and Scotch organization of machinists known as the Amalgamated Engineers imposing conditions which the Employers' Federation refused to accept. A strike of almost a hundred thousand men followed and lasted seven months, until the end of January, 1898, when the men surrendered. While it continued the iron trade of Great Britain was greatly embarrassed, especially the shipbuilding interest. With this exception, however, the European iron trade was prosperous all through 1897, and it has been equally prosperous thus far in 1898. It had been prosperous also in the latter half of 1895 and in the whole of 1896.

GREAT BRITAIN.

The British Iron Trade Association estimates the production of pig iron in Great Britain in 1897 at 8,789,455 long tons, against an ascertained production of 8,659,681 tons in 1896, these being the official Government figures. The largest annual production of pig iron by Great Britain, as officially ascertained, was in 1896. The next largest production was 8,586,680 tons in 1882. The production in the first half of 1898 is estimated by the British Iron Trade Association to have amounted to 4,432,893 tons, indicating a total production for the year equal to that of any preceding year.

According to the authority just quoted the production of Bessemer steel ingots in Great Britain in 1897 was 1,884,155 long tons, against

1,815,842 tons in 1896, and the production of Bessemer steel rails was 921,131 tons, against 817,476 tons in 1896. There were 70 Bessemer converters at work in 1897 and 12 were idle. The production of open-hearth steel ingots in 1897 was 2,601,806 tons, against 2,317,555 tons in 1896. The production of open-hearth steel rails in 1897 was 31,694 tons. The Bessemer steel ingots produced in 1897 were divided into 1,374,339 tons of acid and 509,816 tons of basic steel. The open-hearth steel ingots produced in 1897 were divided into 2,393,718 tons of acid and 208,088 tons of basic steel. The total number of acid open-hearth furnaces is now 316 and 15 are building. The total number of basic open-hearth furnaces is 37 and 4 are building.

The production of Bessemer steel rails in Great Britain in 1897 was 921,131 tons, against 817,476 tons in 1896. Great Britain also made 31,694 tons of open-hearth steel rails in 1897, against 30,058 tons in 1896.

The British Iron Trade Association has ascertained that the production of Bessemer steel ingots in Great Britain in the first half of 1898 amounted to 913,151 tons, against 997,159 tons in the first half of 1897, 905,522 tons in the first half of 1896, and 801,860 tons in the first half of 1895. The production of Bessemer steel rails in the first half of 1898 was 436,385 tons. The same authority has ascertained that the production of open-hearth steel in the United Kingdom in the first half of 1898 amounted to 1,305,771 tons, against 1,353,768 tons in the corresponding half of 1897.

Strange as it may seem, the production of puddled iron in Great Britain has actually increased in late years. The production of puddled bars in 1897 was 1,238,159 tons, against 1,214,005 tons in 1896 and 1,148,012 tons in 1895.

The maximum annual production of iron ore in Great Britain was attained in 1882, when 18,031,957 tons were mined. Since that year there was a steady decline in production until 1893, when the quantity mined was only 11,203,476 tons. Since 1893 there has been a gradual increase in production, the figures for 1896 being 13,700,764 tons and for 1897 being 13,787.878 tons. As far back as 1870 the production was 14,370,655 tons.

The production of coal in Great Britain in 1897 was 202,129,931 tons, against 195,361,260 tons in 1896 and 189,661,362 tons in 1895.

The total exports of iron and steel from Great Britain to all countries in 1897 amounted to 3,691,065 tons, against 3,550,398 tons in 1896 and 2,835,541 tons in 1895. During the last four years the imports of iron and steel into Great Britain have largely increased. They amounted to 361,300 tons in 1897, against 292,908 tons in 1894. Great Britain imported from Germany and Belgium in 1897 about 76,000 tons of beams and girders, valued at nearly a million pounds sterling. During the same year 18,036 tons of steel rails were exported from Germany to England. The imports of pig iron and steel into Great Britain from the United States in the first seven months of 1897 and 1898 were as

follows: Pig iron, 1897, 47,848 tons; 1898, 33,724 tons; steel, 1897, 24,011 tons; 1898, 15,674 tons.

The exports of iron and steel from Great Britain to all countries in the first seven months of 1898 amounted to 1,931,572 long tons, against 2,183,485 tons in the same months of 1897 and 1,999,211 tons in the same months of 1896. The exports of tin plates to the United States in the same period amounted to 45,162 tons, against 56,564 tons in the first seven months of 1897 and 73,552 tons in the same months of 1896.

GERMANY.

This country is making more rapid progress in the production of iron and steel than any other European country. Its iron and steel statistics embrace the production of Luxemburg.

The production of pig iron in Germany and Luxemburg in 1897 was 6,879,541 metric tons, according to Dr. Rentzsch, the statistician of the Association of German Iron and Steel Manufacturers, against 6,372,575 tons in 1896 and 5,464,501 tons in 1895. Of the production in 1897 Germany made 6,007,083 tons and Luxemburg 872,458 tons. In the first seven months of 1898 the production of pig iron in Germany amounted to 4,219,325 metric tons. The production of all kinds of finished steel in Germany and Luxemburg in 1897 is reported to us by Dr. Rentzsch to have amounted to 5,119,300 metric tons. The production of finished steel in 1896 amounted to 4,796,226 metric tons. Of the pig iron now annually produced in Germany and Luxemburg, about 50 per cent is Thomas, or basic, pig iron.

The production of iron ore in Germany and Luxemburg in 1897 amounted to 15,448,212 metric tons, of which Germany produced 10,099,202 tons and Luxemburg 5,349,010 tons. In 1896 the total production amounted to 14,162,335 tons, of which Germany produced 9,403,594 tons and Luxemburg 4,758,741 tons.

The total production of coal in Germany in 1897 amounted to 120,431,056 metric tons, of which 91,007,624 tons were bituminous coal and 29,423,432 tons were brown coal. In 1896 the total production of coal was 112,471,106 tons, of which 85,690,233 tons were bituminous coal and 26,780,873 tons were brown coal.

FRANCE.

The production of pig iron in France in 1897 was 2,472,143 metric tons, against 2,339,537 tons in 1896 and 2,003,868 tons in 1895. The production of Bessemer steel ingots in France in 1897 amounted to 806,853 tons, against 726,463 tons in 1896, and the production of open-hearth steel ingots in 1897 was 474,742 tons, against 454,280 tons in 1896. The total production of Bessemer and open-hearth steel ingots in 1897 was 1,281,595 metric tons, against 1,180,743 tons in 1896. These statistics are given upon the authority of the Comité des Forges de France, and are provisional for 1897. For 1896 they are final.

The production of iron ore in France in 1896, not including Algeria, amounted to 4,062,390 metric tons, against 3,679,767 tons in 1895. Official statistics for 1897 have not yet appeared.

The production of coal in France in 1897 amounted to 30,735,353 metric tons, against 29,189,900 tons in 1896 and 28,019,893 tons in 1895.

ALGERIA.

The iron ore mined in Algeria in 1896 amounted to 374,476 metric tons, against 318,416 tons in 1895. These are official figures.

BELGIUM.

The production of pig iron in Belgium in 1897 amounted to 1,034,732 metric tons, against 959,414 tons in 1896 and 829,234 tons in 1895. The production of steel ingots in Belgium in 1897 amounted to 616,604 metric tons, against 598,974 tons in 1896 and 454,619 tons in 1895. The production of pig iron in the first seven months of 1898 was 585,095 tons. The production of iron ore in Belgium in 1896 amounted to 307,031 metric tons, against 312,637 tons in 1895.

The production of coal in Belgium in 1897 amounted to 21,534,629 tons, against 21,252,370 tons in 1896 and 20,450,604 tons in 1895.

AUSTRIA-HUNGARY.

The production of pig iron in Austria alone in 1897 was 887,945 metric tons, against 816,967 tons in 1896. Statistics for Hungary for 1897 are not yet at hand. In 1896 the production of pig iron in that country amounted to 400,815 tons. The production of both countries in 1896 was 1,217,782 tons.

The production of Bessemer and open-hearth steel in Austria-Hungary in 1896 amounted to 880,696 metric tons, against 744,547 tons in 1895. Of the total production in 1896, 343,861 tons were made by the Bessemer process and 536,835 tons by the open-hearth process. Almost all the open-hearth steel produced in Austria-Hungary is now made by the basic process. About two-thirds of the Bessemer steel is also produced by the same process. The following are the figures for 1896: Acid Bessemer steel, 120,103 tons; basic Bessemer steel, 223,758 tons; total, 343,861 tons. Acid open-hearth steel, 23,000 tons; basic open-hearth steel, 513,835 tons; total, 536,835 tons.

The production of iron ore in Austria alone in 1897 amounted to 1,613,876 tons. Iron-ore statistics for 1897 have not yet been received for Hungary. In 1896 the total production of iron ore in the whole of Austria-Hungary amounted to 2,718,295 metric tons, of which Austria produced 1,448,615 tons and Hungary 1,269,680 tons.

The production of coal in Austria alone in 1897 amounted to 30,950,863 metric tons, of which 20,458,092 tons were brown coal and 10,492,771 tons were stone coal. The production of coal in Hungary in 1896, the latest year for which we have statistics, amounted to 4,894,353 tons, of

which 3,761,728 tons were brown coal and 1,132,625 tons were stone coal. The total production of all kinds of coal in the Austro-Hungarian Empire in 1896, for which year we have complete statistics for both countries, amounted to 33,676,411 tons, against 32,654,777 tons in 1895.

SWEDEN.

The production of pig iron in Sweden in 1897 was 538,197 metric tons, against 494,418 tons in 1896 and 462,930 tons in 1895. The production of Bessemer steel ingots in Sweden in 1897 was 107,679 tons, against 114,120 tons in 1896, and the production of open-hearth steel ingots was 165,836 tons, against 142,301 tons in 1896. The production of crucible-steel ingots in 1897 was 691 tons, against 604 tons in 1896; and the production of blister steel in 1897 was 922 tons, against 624 tons in 1896. The production of iron ore in 1897 was 2,087,166 tons, against 2,039,019 tons in 1896. The exports of iron ore from Sweden in 1897 amounted to 1,400,399 metric tons, against 1,150,695 tons in 1896, 800,452 tons in 1895, 831,395 tons in 1894, 484,055 tons in 1893, and 320,071 tons in 1892. The production of coal and lignite in Sweden in 1897 amounted to 224,343 tons, against 225,848 tons in 1896.

SPAIN.

The production of pig iron in Spain in 1897 amounted to 297,100 metric tons, against 246,326 tons in 1896 and 206,452 tons in 1895. The production of Bessemer steel ingots in Spain in 1897 amounted to 63,200 tons, against 62,511 tons in 1896, and the production of open-hearth steel ingots in 1897 amounted to 38,600 tons, against 42,066 tons in 1896.

The production of iron ore in Spain in 1897 appears to have been the largest in the history of the country, amounting to 7,468,500 metric tons, against 6,762,582 tons in 1896 and 5,514,339 tons in 1895. There were exported 6,884,588 tons in 1897, against 6,272,588 tons in 1896, of which Great Britain took 5,091,027 tons in 1897 and 4,635,959 tons in 1896.

The estimated production of coal and lignite in Spain in 1897 amounted to 1,939,400 metric tons, against 1,908,360 tons in 1896. Of the total quantity 55,900 tons were classed as lignite in 1897 and 55,413 tons were so classed in 1896. All the statistics we have given for Spain for 1897 are preliminary and are subject to revision.

ITALY.

The production of pig iron in Italy in 1897 amounted to 8,393 metric tons, against 6,987 tons in 1896. The production of all kinds of finished steel in 1897 was 63,940 tons, against 65,955 tons in 1896. The production of iron ore in 1897, nearly all of which was mined on the Island of Elba, amounted to 200,709 tons, against 203,966 tons in 1896. The production of coal in 1897 (anthracite, lignite, and bituminous) amounted to 314,222 tons, against 276,197 tons in 1896.

RUSSIA.

According to a recent issue of the Bulletin Russe de Statistique Financière et de Législation the production of pig iron in Russia and Finland in 1897 amounted to 1,868,671 metric tons, against 1,612,069 tons in 1896, 1,452,380 tons in 1895, 1,332,505 tons in 1894, 1,148,937 tons in 1893, 1,071,813 tons in 1892, 1,004,923 tons in 1891, and 926,482 tons in 1890.

The same authority says that the production of all kinds of steel in Russia, including Finland, amounted in 1895 to 879,075 metric tons, as compared with 726,017 tons in 1894, 630,796 tons in 1893, 514,986 tons in 1892, 433,477 tons in 1891, and 378,422 tons in 1890. The production of steel ingots in Russia in 1897 is given by another authority as amounting to 1,153,000 metric tons and the production of rolled steel to 868,000 metric tons.

According to the same authority the production of iron ore in Russia amounted to 2,924,963 metric tons in 1895, against 2,484,938 tons in 1894, 2,194,102 tons in 1893, 2,044,106 tons in 1892, 1,958,452 tons in 1891, and 1,795,663 tons in 1890.

The same authority says that the production of coal and lignite in Russia amounted to 9,463,300 metric tons in 1896, against 9,098,800 tons in 1895, 8,762,600 tons in 1894, 7,122,500 tons in 1893, 6,946,200 tons in 1892, 6,233,200 tons in 1891, and 6,015,000 tons in 1890. The production of lignite in Russia is very small; in 1895 it amounted to only 133,000 tons.

DOMINION OF CANADA.

The production of pig iron in the Dominion of Canada in 1897, as ascertained from the manufacturers by the American Iron and Steel Association, was 53,796 long tons, against 60,030 tons in 1896. The production of steel in 1897, all made by the open-hearth process, as ascertained by the same authority, was 18,400 long tons, against 16,000 tons in 1896. The production of all kinds of iron and steel rolled into finished forms, excluding muck and scrap bars, billets, etc., amounted to 77,021 long tons in 1897, against 75,043 tons in 1896 and 66,402 tons in 1895.

The production of coal in the Dominion of Canada in 1897 is reported to have amounted to 3,460,894 long tons, against 3,344,389 tons in 1896. The production of coke, all made in Nova Scotia and British Columbia, amounted to 70,367 long tons in 1897, against 44,303 tons in 1896. The production of iron ore in 1897 was 63,796 long tons, against 82,059 tons in 1896. The figures for 1897 are all subject to revision.

Canada now has 8 completed blast furnaces and 1 building, 17 rolling mills, and 1 open-hearth steel plant. The new furnace that is being built is at Deseronto, Ontario. It is now nearly completed.